

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-12 (Cancelled)

13. (Previously Presented) A sheet-actuated vacuum assisted sheet conveyor for the continuous transfer of sheets delivered in serial spaced relation, said conveyor comprising:

a pair of laterally spaced, parallel driven flat coplanar conveyor belts operating over a flat surface of a vacuum plenum, the flat plenum surface between the belts recessed from the coplanar flat belts to define a shallow vacuum channel;

a plurality of vacuum control valves in said flat surface spaced in a direction of conveyor belt movement and providing vacuum communication between the plenum and the vacuum channel;

said control valves operative to be held closed in the absence of a sheet on the conveyor, by a negative pressure in the plenum sufficient to create a first pressure differential across the valves, said valves including means for biasing the valves to open for vacuum communication at a second pressure differential across the valves less than the first pressure differential;

means for moving sheets into planar contact with the conveyor belts in a manner that progressively covers said vacuum channel; and,

means for applying the plenum vacuum to an upstream end of the vacuum channel upstream of the upstreammost valve such that, as a sheet moves to progressively cover said vacuum channel, vacuum pressure in the channel moves in a downstream direction with the sheet to cause the pressure differential across each valve in succession to decrease to said second pressure differential and said valves to serially open, thereby

applying the plenum vacuum directly to the sheet to hold the same against and to move with the conveyor belts.

14. (Previously Presented) The apparatus as set forth in claim 13 wherein said vacuum control valves each comprises:

a vacuum opening in the flat surface of the vacuum channel; and,

a valve plate attached to the plenum surface and operative to seal the vacuum opening against the valve bias at said first pressure differential.

15. (Previously Presented) The apparatus as set forth in claim 14 wherein the valve plate of each valve comprises a thin spring steel plate attached at one edge to the flat surface and permanently bent along a hinge line to define a flat body portion extending away from the flat surface at an actuate angle when the valve is open.

16. (Previously Presented) The apparatus as set forth in claim 13 wherein the means for applying the plenum vacuum pressure to the upstream end of the vacuum channel comprises a vacuum starter opening in the flat surface.

17. (Original) The apparatus as set forth in claim 16 comprising a plurality of laterally adjacent vacuum channels operatively connected to the vacuum plenum, each channel providing support for an incremental width of a sheet.

18. (Previously Presented) The apparatus as set forth in claim 17 wherein a vacuum starter opening of each of the vacuum channels is connected by a starter vacuum conduit to a laterally adjacent vacuum channel such that plenum vacuum pressure in said laterally adjacent channel, when the control valve for the channel to which said laterally adjacent channel is connected is open, is communicated to the starter opening of said laterally adjacent channel.

19. (Previously Presented) The apparatus as set forth in claim 18 wherein each starter vacuum conduit includes a vacuum inlet end in the flat plenum surface of the directly adjacent vacuum channel.

20. (Previously Presented) The apparatus as set forth in claim 18 comprising a vacuum starter opening in each of a selected number of non-adjacent channels and a starter vacuum conduit operatively connecting each of the vacuum starter openings in each of said selected non-adjacent channels with a serially adjacent vacuum channel between said selected non-adjacent channel and the next selected non-adjacent channel.

21. (Previously Presented) The apparatus as set forth in claim 13 wherein each of said vacuum control valves comprises:

a vacuum opening in the flat plenum surface of the vacuum channel; and,
a poppet valve having a valve head adapted to cover and close the vacuum opening at said first pressure differential, and a valve spring operative to bias the valve head to open said vacuum opening at said second pressure differential.

22. (Withdrawn) A method for vacuum assisted transfer of sheets delivered in serial spaced relation, comprising the steps of:

(1) driving a pair of laterally spaced coplanar parallel flat conveyor belts over a surface of a vacuum plenum with the plenum surface between the belts recessed from the flat belts to define a shallow vacuum channel;

(2) positioning a plurality of vacuum control valves in said vacuum surface spaced in the direction of conveyor belt movement and providing fluid communication between the plenum and the vacuum channel;

(3) holding said control valves closed by generating a negative pressure in the plenum sufficient to create a first pressure differential across the valves;

(4) biasing said valves to open for fluid communication at a second pressure differential across the valves less than the first pressure differential;

(5) moving the sheets into planar contact with the conveyor belts to cause each sheet to progressively cover said vacuum channel;

(6) applying a starter vacuum pressure to an upstream end of the vacuum channel upstream of the upstreammost valve; and,

(7) utilizing a moving sheet to progressively cover said vacuum channel, causing the vacuum pressure in the channel to move downstream with the sheet, the pressure differential across each valve in succession to decrease to said second pressure differential, and said valves to serially open, thereby applying the plenum vacuum pressure directly to the sheet to hold the sheet against and to move with the conveyor belts.

23. (Withdrawn) The method as set forth in claim 22 including the steps of:

(1) providing a plurality of laterally adjacent vacuum channels;

(2) utilizing said adjacent channels to provide support for incremental widths of the sheet; and,

(3) transferring the negative plenum pressure from the vacuum channel to which the starter vacuum is applied to the upstream ends of said laterally adjacent vacuum channels serially in response to the opening of each respective control valve.

24. (Withdrawn) The method as set forth in claim 23 including the step of limiting the number of laterally adjacent vacuum channels to which negative plenum pressure is transferred.

25. (Withdrawn) The method as set forth in claim 24 wherein the limiting number of laterally adjacent vacuum channels is two.

26. (New) A self-valving vacuum distribution system for a belt-driven sheet transfer apparatus comprising:

a vacuum plenum having a flat surface over which a pair of spaced conveyor belts operate to define an open vacuum channel; and,

vacuum control valves spaced along the channel in the flat plenum surface, said valves held closed by a high pressure differential between the vacuum plenum and the open vacuum channel and biased to open under a reduced pressure differential between the vacuum plenum and the vacuum channel, the reduced pressure differential provided by a plenum vacuum connection between an upstream end of the vacuum channel when the channel is covered by a sheet carried over the channel on the conveyor belts, the open vacuum channel permitting the plenum vacuum to move downstream as the channel is covered;

a vacuum starter opening in the plenum surface upstream of the control valves providing initial vacuum communication between the plenum and the upstream end of the vacuum channel;

an infeed device adapted to move a line of spaced sheets in series into contact with the conveyor belts and to cause a leading edge of each sheet to override the vacuum starter opening and each control valve in succession;

each of said control valves including a flat resilient metal plate operatively connected by an edge to the plenum flat surface, said plate having a closure face bent away at an acute angle from the plane of the flat surface to provide the bias to open at said reduced pressure differential; and,

a vacuum opening in the plenum flat surface providing vacuum communication between the plenum and the vacuum channel, said vacuum opening aligned with the valve plate and closed thereby at said high pressure differential.